SHEET INDEX

CONTENTS	SHEET NO.	SHEET ISSUE
SHEET INDEX SUPPORTING INFORMATION CURRENT DRAIN USED ON NOTES SYMBOL RECORD OF CHANGES	1	2
CIRCUIT SCHEMATIC	2	1
COMPONENT LIST CIRCUIT DESCRIPTION	3	2

SYMBOL

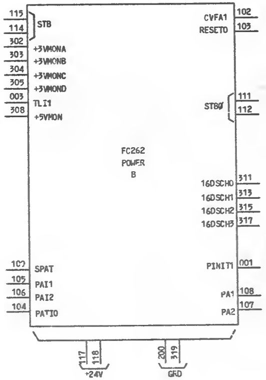
CONTROL AND TIMING
ELEMENT IDENT
A

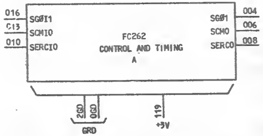
TERM. MOD	FUNCT	TERM.	LOC
SCMIO	I	013	2G1
SERCIO	I	010	2G1
SG0I1	I	016	2F1
SCMO	0	006	2G7
SERCO	0	008	2G7
SG01	0	004	2F7
+3V	P	119	2H2
GRD	G	0GD	2H3
GRD	G	2GD	2H3

POWER
ELEMENT IDENT
B

TERM. MOD	FUNCT	TERM.	LOC
+3VMONA	I	302	2A1
+3VMONB	I	303	2B1
+3VMONC	I	304	2B1
+3VMOND	I	305	2C1
+5VMON	I	308	2C1
PAI1	I	105	2F1
PAI2	I	106	2F1
PATIO	I	104	2E1
SPAT	I	109	2E1
STB	I	114	2A1
STB	I	115	2A1
TLI1	I	003	2D1
PINIT1	0	001	2E8
STB0	0	111	2C3
STB0	0	112	2D8
16DSCH0	0	311	2D8
16DSCH1	0	313	2D8
16DSCH2	0	315	2D8
16DSCH3	0	317	2E8
CVFA1	0I	102	2B8
PA1	0I	108	2F8
PA2	0I	107	2F8
RESETO	0I	103	2B8
+24V	P	117	2D1
+24V	P	118	2E1
GRD	G	200	2E1
GRD	G	319	2E1

SYMBOL





RECORD OF CHANGES

DWG ISS	PREV FURN	STD	MFR DISC	SEE NOTE

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS
CAPACITANCE VALUES ARE IN MICROFARADS
VALUES PRECEDED BY THE SYMBOL + (PLUS) OR – (MINUS) ARE IN VOLTS.

2. POWER AND GROUND TERMINALS FOR INTEGRATED CIRCUITS:

IC CODE	GRD TERM.			

3. BATTERY AND GROUND TERMINALS FOR THIS CIRCUIT PACK ARE AS FOLLOWS:

FUNCTION	TERMINAL
+3V	119
+24V	117,118
GRD	0GD,2GD,200,319

DWG ISSUE	DATE ISSUE	DRAWN	APPD
1	11-20-75	AS LRE	JBD CEJ RFG
2A	11-20-75	LRE LRE	CWD LEG RFG

SYSTEM USED ON	DESIGN CONTROL
COMMON SYSTEMS	IH

CURRENT DRAIN:

ON +24V – 15.5mA

ON +3V – 20mA

SHEET INDEX NOTES

1. FOR SINGLE REISSUES, A CHANGED OR NEW SHEET WILL BE ASSIGNED THE SAME ISSUE NUMBER AS SHEET 1.
2. FOR CONCURRENT REISSUES, A CHANGED OR NEW SHEET WILL BE ASSIGNED THE HIGHEST ISSUE NUMBER AFFECTING THAT SHEET.
3. THE ISSUE NUMBER OF SHEET 1 IS RECOGNIZED AS THE ISSUE NUMBER OF THE WHOLE DRAWING.

SUPPORTING INFORMATION

CATEGORY	NUMBER
CONNECTOR ON FRAME	946C
CIRCUIT PACK INFORMATION DRAWING	FC262
SERIES FOR LATEST CLASS "A" CHANGE	
ACCEPTABLE SERIES	2

NOTICE- NOT FOR USE OR DISCLOSURE OUTSIDE THE BELL SYSTEM EXCEPT UNDER WRITTEN AGREEMENT.

1N98

FC262 CIRCUIT PACK

POWER CONTROL BOARD
CIRCUIT

②

AT&TCO
STANDARD

DWG SIZE 6S

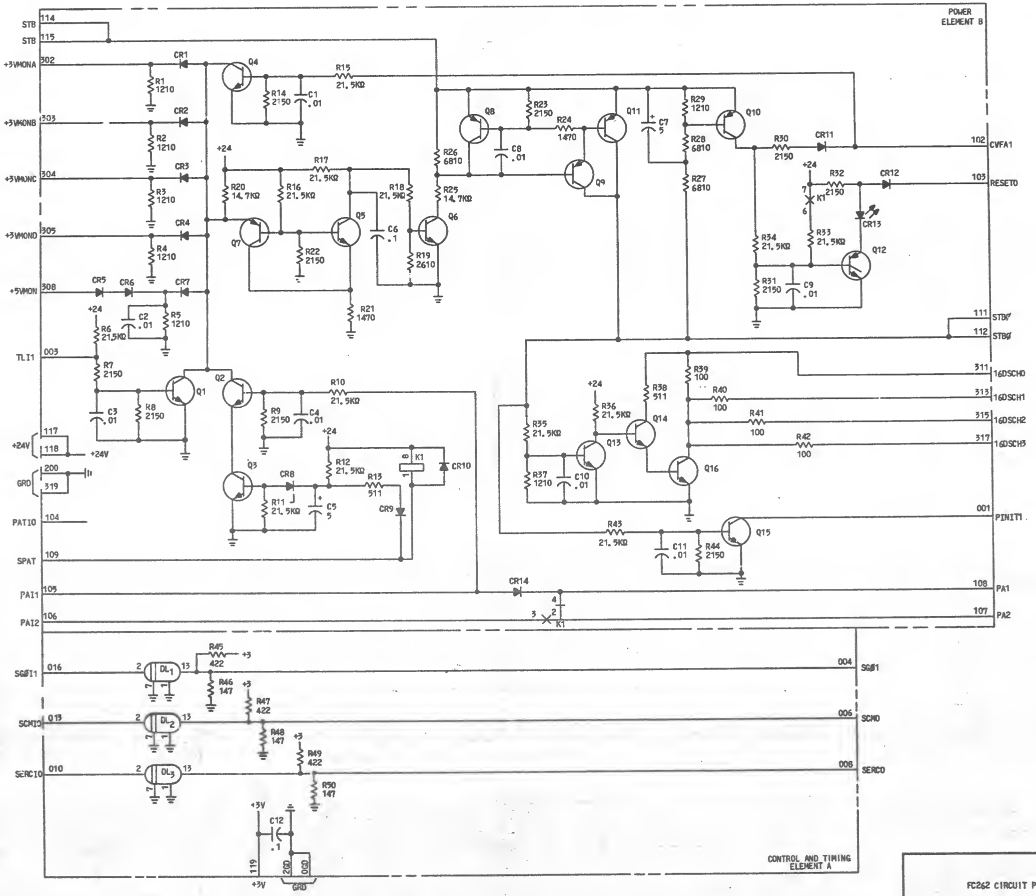
ISSUE 2A

BELL LABORATORIES

CPS-FC262

3 SHEETS

PRINTED IN U.S.A.



FC262 CIRCUIT PACK

②

CPS-FC262
SHEET 2

BELL TELEPHONE LABORATORIES
INCORPORATED

6S

ISSUE
1

COMPONENT LIST

CAPACITOR

DESIG	CODE
[4] C1-C4	KS-19774 L2,.01
C5	601A ,5
C6	KS-19774 L6,.1
C7	601A ,5
[4] C8-C11	KS-19774 L2,.01
C12	KS-19774 L6,.1

DELAY LINE

DESIG	CODE
[3] DL1-DL3	DR1080 60nS,100Ω ENGINEERED COMPONENTS COMPANY

DIODE

DESIG	CODE
CR1	458A
CR2	↓
CR3	↓
CR4	↓
CR5	↓
CR6	↓
CR7	458A
CR8	459AA
CR9	458A
CR10	↓
CR11	↓
CR12	458A
CR13	541G (LED)
CR14	458A

RELAY

DESIG	CODE
K1	KS-21490 L1

RESISTOR

DESIG	CODE
[5] R1-R5	KS-20616 L1A,1210
[2] R6,R7	21.5KΩ
[2] R8,R9	2150
[3] R10-R12	21.5KΩ
R13	511
R14	2150
[4] R15-R18	21.5KΩ
R19	2610
R20	14.7KΩ
R21	1470
[2] R22,R23	2150
R24	1470
R25	14.7KΩ
[3] R26-R28	6810
R29	1210
[3] R30-R32	2150
[4] R33-R36	21.5KΩ
R37	1210
R38	511
[4] R39-R42	100
R43	21.5KΩ
R44	2150
R45	422
R46	147
R47	422
R48	147
R49	422
R50	KS-20616 L1A,147

COMPONENT LIST (CONT)

TRANSISTOR

DESIG	CODE
Q1	66J
Q2	↓
Q3	↓
Q4	↓
Q5	↓
Q6	66J
Q7	51A
Q8	↓
Q9	↓
Q10	51A
Q11	58A
Q12	27A
Q13	66J
Q14	66J
Q15	66J
Q16	20L

CIRCUIT DESCRIPTION

A. FUNCTION

THE FC262 CIRCUIT PACK CONTAINS CIRCUITS WHICH MONITOR POWER SUPPLIES, A TERMINATION LOOP, AND THE POWER ALARM (PA) AND FUSE ALARM (FA) NETS IN THE MAIN STORE. IT ALSO SEQUENCES POWER, THEN INITIALIZES THE STORE. IF THIS PACK SENSES TROUBLE ON ANY OF THE LEADS IT MONITORS, IT IMMEDIATELY SHUTS OFF ALL J84422B CONVERTERS,GENERATES AN ALARM, AND LIGHTS AN ALARM INDICATOR.

THE FC262 ALSO CONTAINS THREE 60-ns DELAY LINES WHICH ARE USED BY THE FA1068 PACK. THESE DELAY LINES HAVE NO ASSOCIATION WITH POWER CONTROL,BUT WERE PLACED ON THE FC262 BECAUSE THERE WAS SPARE ROOM.

B. DETAILED DESCRIPTION

THIS PACK MONITORS FOR THE PRESENCE OF +3 V FROM EACH OF THE FOUR J87389F CONVERTERS IN THE MAIN STORE CONTROLLER AND FOR THE PRESENCE OF +5 V, WHICH IS USED TO TERMINATE THE SIGNAL LINES BETWEEN THE MAIN STORE CONTROLLER (MASC) AND ALL MAIN STORE MEMORIES (MASMS). IF ANY OF THESE VOLTAGES ARE MISSING, THE FC262 CAUSES POWER TO THE MEMORY PLANES TO BE REMOVED TO PREVENT DAMAGE. THESE VOLTAGES MUST BE MONITORED DIRECTLY RATHER THAN RELY ON THE PA NETWORK, BECAUSE THE CONVERTERS MAY NOT BE PLUGGED INTO THEIR CONNECTORS WHEN POWER IS APPLIED AND HENCE WILL NOT GENERATE A POWER ALARM.

THE PRESENCE OF ALL THE TERMINATION PADDLE BOARDS IS CHECKED BY SENSING THE INTEGRITY OF A GROUND WHICH LOOPS THROUGH ALL PADDLE BOARDS. AGAIN, POWER TO THE MEMORY PLANES IS SHUTDOWN IF THIS GROUND IS NOT PRESENT ON LEAD TLI1.

THE FC262 ALSO MONITORS FOR POWER ALARMS FROM ALL THE J87421A CONVERTERS, AND FOR FUSE ALARMS FROM ANY CONVERTER IN THE PROCESSOR FRAME. IF THE CIRCUIT SENSES AN ALARM, IT SHUTS OFF POWER TO THE J87422B CONVERTERS TO PREVENT POSSIBLE DAMAGE TO THE MEMORY PLANES.

POWER TO THE MEMORIES IS SUPPLIED BY J87422B CONVERTERS, WHICH ARE CONTROLLED BY LEAD STBØ FROM THE FC262. WHEN J87422B'S ARE TO BE STARTED, LEAD STBØ IS PULLED UP TO +24V. FOR TROUBLE SHUTDOWN, LEAD STBØ IS OPENED, ITS VOLTAGE DROPS TO GROUND, AND ALL J87422B'S TURN OFF. WHEN LEAD STBØ IS OPENED AND THE J87422B'S TURN OFF.

DURING THE TIME THE J87422B'S ARE OFF, LEAD PINITI1 IS OPEN, WHICH CAUSES THE MASC TO BE IN THE POWER INITIALIZE STATE. FOR NORMAL OPERATION, LEAD PINITI1 IS GROUNDED.

A TROUBLE SHUTDOWN CAUSES THE LIGHT EMITTING DIODE (LED) INDICATOR TO TURN ON AND THE PACK TO SEND OUT A FUSE ALARM. THE LED IS TURNED OFF AFTER +24 V IS REMOVED FROM LEAD STB, AND WHEN LEAD RESETO IS MOMENTARILY GROUNDED BY THE NPA NET.

THE PA NET FOR THE PROCESSOR FRAME IS DIVIDED INTO TWO SEPARATE LOOPS: AN INTERNAL LOOP (PAI1,PAI2) WHICH MONITORS ALL THE J87421A CONVERTERS PLUS THE J87389J CONVERTER WHICH IS USED FOR TERMINATIONS; AND AN EXTERNAL LOOP (PA1,PA2), WHICH MONITORS ALL OTHER CONVERTERS. DURING A PA TEST, A RELAY ON THE FC262 CONNECTS THESE TWO PA LOOPS IN SERIES TO SIMULTANEOUSLY TEST THE INTEGRITY OF EACH. THE PA TEST BEGINS WHEN LEAD SPAT IS GROUNDED AND RELAY K1 CONNECTS THE TWO PA LOOPS IN SERIES AND LIGHTS THE LED TO SHOW THAT K1 HAS OPERATED CORRECTLY. A GROUND ON SPAT ALSO DISABLES THE PA MONITORING CIRCUIT ON THIS PACK, SO THAT IT DOES NOT FALSELY SHUT DOWN POWER DURING THIS TEST.

CIRCUIT DESCRIPTION (CONT)

AT THE END OF THE PA TEST, LEAD SPAT IS OPENED AND THE RELAY IS RELEASED, BUT THE PA MONITOR CIRCUIT IS HELD INACTIVE FOR AT LEAST AN ADDITIONAL 50 MS BY A TIMING CIRCUIT TO ALLOW THE PA LOOP TO RETURN TO THE NO-ALARM STATE. WHEN THE RELAY RELEASES, THE INTERNAL AND EXTERNAL PA LOOPS ARE ISOLATED BY RELAY CONTACT 3 AND BY DIODE CR14. THE PA MONITOR IS THEN SENSITIVE ONLY TO A POWER ALARM ON THE INTERNAL PA LOOP. THE LED IS TURNED OFF AT THE END OF THE PA TEST BY A MOMENTARY GROUND ON LEAD RESETO.

ALL LONG MONITOR LEADS ARE BUFFERED AGAINST HIGH FREQUENCY NOISE BY 0.01 µF CAPACITORS ON THEIR INPUTS. CAPACITOR C6 INTRODUCES ENOUGH DELAY TO PREVENT A FALSE OPENING OF LEAD STBØ FOR TRANSIENTS OF 1 MS OR LESS. CAPACITOR C7 ASSURES THAT TRANSIENTS OF 6 MS OR LESS WILL NOT CAUSE THE FC262 TO GENERATE A FUSE ALARM.

THE THREE DELAY LINES WITH RESISTOR TERMINATIONS EACH DELAY STORE CONTROL SIGNALS BY 60 ns TO ASSURE THAT OTHER STORE BUS LEADS ARE VALID.

C. SYMBOL/LEAD MNEMONICS

MNEMONIC	DEFINITION
CVFA1	CONVERTER FUSE ALARM - HIGH MEANS ALARM AND FC262 OPENS LEAD STBØ.
GRD	GROUND
PAI1	POWER ALARM, INTERNAL NET - HIGH MEANS ALARM AND FC262 OPENS LEAD STBØ.
PAI2	POWER ALARM, INTERNAL NET - HIGH MEANS ALARM AND FC262 OPENS LEAD STBØ IF PAI1 AND PAI2 ARE CONNECTED.
PATIO	POWER ALARM TEST - THIS LEAD NOT USED BY FC262.
PA1	POWER ALARM, EXTERNAL NET - HIGH MEANS ALARM, BUT FC262 DOES NOT TAKE ANY ACTIONS.
PA2	POWER ALARM, EXTERNAL NET - HIGH MEANS ALARM, BUT FC262 DOES NOT TAKE ANY ACTIONS.
PINITI1	POWER INITIALIZE - AN OPEN KEEPS MASC IN INITIALIZE STATE.
RESETO	RESET FOR LED - GROUND EXTINGUISHES LAMP.
SCMIO	STORE COMPLETE INPUT
SCMO	STORE COMPLETE OUTPUT
SERCIO	STORE ERROR C INPUT
SERCO	STORE ERROR C OUTPUT
SGØI1	STORE GO INPUT
SGØ1	STORE GO OUTPUT
SPAT	SPECIAL POWER ALARM TEST - GROUND BEGINS TEST
STBØ	START B - HIGH SUPPLIES +24 V START POWER TO FC262.
STB	START B OUTPUT - HIGH SUPPLIES +24 V START POWER TO ALL J87422B'S.
TLI1	TERMINATION LOOP MONITOR - NORMALLY GROUND. OPEN MEANS TROUBLE CONDITION AND FC262 OPENS LEAD STB.
16DSCH0 16DSCH1 16DSCH2 16DSCH3	THESE FOUR LEADS, NO LONGER CONNECTED TO OUTSIDE CKTS, WERE ORIGINALLY USED WITH J87422A CONVERTERS AND 24A MEMORY DEVICES.
+24V	24-VOLT INPUT POWER.
+3V	3-VOLT INPUT POWER.
+3VMONA	3-VOLT MONITOR A - LOW MEANS TROUBLE CONDITION.
+3VMONB	3-VOLT MONITOR B - LOW MEANS TROUBLE CONDITION.
+3VMONC	3-VOLT MONITOR C - LOW MEANS TROUBLE CONDITION.
+3VMOND	3-VOLT MONITOR D - LOW MEANS TROUBLE CONDITION.
+5VMON	5-VOLT MONITOR - LOW MEANS TROUBLE CONDITION.

ISSUE
2A

FC262 CIRCUIT PACK
②
BELL TELEPHONE LABORATORIES
INCORPORATED
6S

CPS-FC262
SHEET 3